

## ABSTRACT

An object of the present invention is to enable optimal clustering for many types of noise data and to improve the accuracy of estimation of a speech model sequence of input  
5 speech.

Noise is added to speech in accordance with noise-to-signal ration conditions to generated noise-added speech (step S1), the mean value of speech cepstral is subtracted from the generated, noise-added speech (step S2),  
10 a Gaussian distribution model of each piece of noise-added speech is created (step S3), the likelihoods of the pieces of noise-added speech are calculated to generate a likelihood matrix (step S4) to obtain a clustering result. An optimum model is selected (step S7) and linear transformation is  
15 performed to provide a maximized likelihood (step S8).

Because noise-added speech is consistently used both in clustering and model learning, clustering for many types of noise data and an accurate estimation of a speech model sequence can be achieved.

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